MUSHTARI, Kh M

Muštari, H. M. On the domain of applicability of the linear theory of elastic shells. Doklady Akad. Nauk SSSR (N.S.) 58, 997–998 (1947). (Russian)

The author linearizes the equations of the shell theory developed by J. L. Synge and W. Z. Chien [von Kármán Anniversary Volume, pp. 103–120, Berkeley, Calif., 1941; these Rev. 3, 30] and makes remarks concerning their validity. [Cf. the preceding review.] *I. S. Sokolnikoff.*

Source: Mathematical Reviews, Vol 9 No. 6

MUŠTARI, H M.

Muštari, H. M., and Vinokurov, S. G. Determination of the stressed state for elastic equilibrium in the boundary zone of thin shells of certain types. Izvestiya Kazan. Filial. Akad. Nauk SSSR. Ser. Fiz.-Mat. Tehn. Nauk **1**, 9–24 (1948). (Russian)

The authors present the application of Muštari's theory for finding the stresses in the boundary zone of shells [Akad. Nauk SSSR. Prikl. Mat. Meh. **12**, 129–136 (1948); these Rev. **9**, 547]. This paper begins with a summary of the general theory, introduces certain simplifications and gives an estimate of errors due to these simplifications. The theory is applied to the following shells: (a) shells of revolution with a spherical shell as a special case; (b) an elliptic cone. The construction of a stress function for boundary zones of shells is also presented.

T. Laser.

SO: Mathematical Reviews, Vol. 14, No. 10, Nov. 53, pp. 935-2048
UNCLASSIFIED

MUSHTARI, Kh. M.

Muštari, H. M. Invariant equations of equilibrium of the boundary zone of an elastic shell in complex form. Akad. Nauk SSSR. Prikl. Mat. Meh. 12, 129–136 (1948). (Russian)

The author follows the customary procedure [see, for example, W. Z. Chien, Quart. Appl. Math. 1, 297–327 (1944); these Rev. 5, 195] to formulate a system of six invariant macroscopic equations of shell theory. An assumption of the Kirchhoff-Love hypothesis and a definition of the complex stress tensor in terms of the usual macroscopic stress tensor and the quantities depending on the geometry of the middle surface enable the author to write a set of approximate equilibrium equations on the complex stress tensor. The goodness of approximation in these equations depends on the thickness of the shell. It is shown that the complex stress tensor may be obtained from a stress function satisfying a certain fourth-order partial differential equation. The simplifications resulting from an assumption that the surface of the shell is developable are indicated in some detail. *I. S. Sokolnikoff* (Los Angeles, Calif.).

Source: Mathematical Reviews, Vol 9 No. 7

MUSHTARI, Kh.M.

Determining the deformation of medium shell surfaces subjected to arbitrary bending. Trudy KKHTI no.13:132-137 '48. (MIRA 12:12)

1. Kazanskiy khimiko-tekhnologicheskiy institut im. S.M. Korova, kafedra teoreticheskoy mekhaniki.
(Elastic plates and shells)

MUSHTARI, KH. M.

PA 42/49T28

USSR/Engineering — Mar/Apr 49
Mechanics
Mathematics - Applied

"Qualitative Investigation of Strain in Elastic Shells for Small Deformations and Arbitrary Displacements," Kh. M. Mushtari, Physicotech Inst, Kazan Affiliate, Acad Sci USSR, 14 pp

"Priklad Matemat i Mekh" Vol XIII, No 2

Classifies problems of linear and nonlinear theory of shells in which the number of types is reduced to a minimum. In addition to cases considered by Wei-Zang-Chien, in which differentiation with respect to Gaussian coordinates does

42/49T28

USSR/Engineering (Contd) — Mar/Apr 49

not change the order of values characterizing deformation, classification also includes boundary effects not subjected to this condition. Establishes region of applicability of the linear theory in general and solutions of boundary effect types in particular. Includes certain problems of strain in average-width shells and several cases in the integration of equations of nonlinear theory. Submitted 18 Jun 48.

42/49T28

155T89

USSR/Physics - Shells, Elastic
Nonlinear Mechanics

Dec 49

"Nonlinear Theory of Equilibrium of the Boundary Zone of an Elastic Shell," Kh. M. Mushtari, Kazan Chemicotech Inst imeni S. M. Kirov, 3 pp

"Dok Ak Nauk SSSR" Vol LXIX, No 4

Derives equation for nonlinear equilibrium of boundary zone in elastic shell. Comparison of linear and nonlinear theory as applied to theoretical example of cylindrical shell of constant thickness, radius R and length 2L, resting on its terminal cross sections $x = \pm L$ and acted upon by uniform internal pressure

155T89

USSR/Physics - Shells, Elastic (Contd)

Dec 49

shows substantial errors are obtained when linear theory is used to determine edge effect in thin elastic shell. Submitted by Acad A. I. Nekrasov 30 Sep 49.

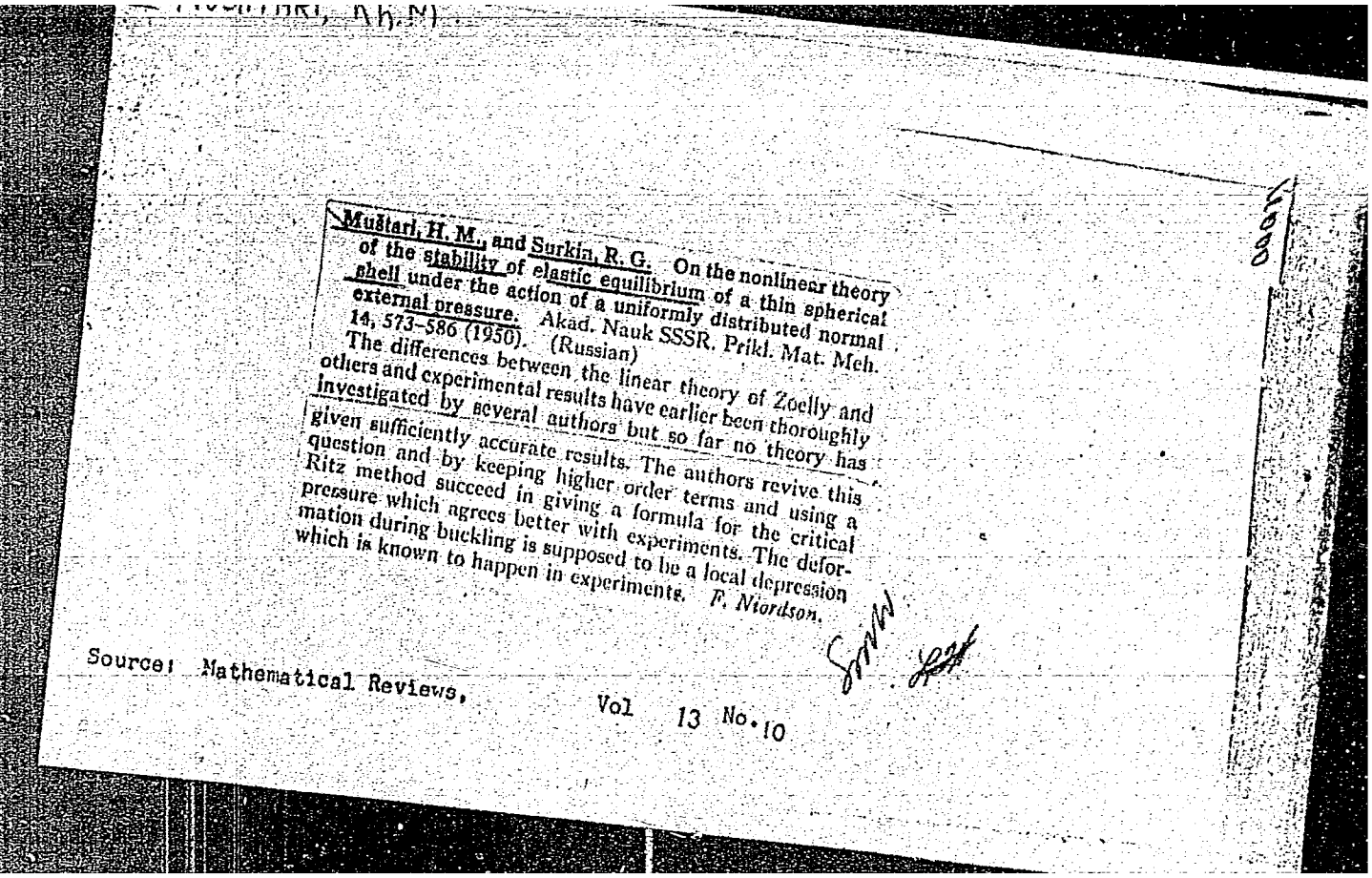
155T89

Mustari, H. M.

Mušhtari, H. M. The theory of elastic equilibrium of plates and shells taking account of the initial stresses. Izvestiya Kazan. Filial. Akad. Nauk SSSR. Ser. Fiz.-Mat. Tehn. Nauk 2, 39–52 (1950). (Russian)

This paper is a continuation of the author's research on **the theory of elastic equilibrium of shells with arbitrary displacements** [Akad. Nauk SSSR. Prikl. Mat. Meh. 13, 121–134 (1949); these Rev. 11, 69]. The author begins with a brief summary of a previous (unavailable) paper [Trudy Kazan. Himiko-Tehnolog. Inst. 13 (1948)], where a prestressed shell is subject to two successive deformations. The author derives the equations of compatibility and those of equilibrium for shells as above. He modifies his general theory for special types of shells subject to certain kinds of deformations. He divides the shells into two types: (1) shells of small curvature, and (2) shells whose dimensionless curvature is of the order of one. The deformations are classified as follows: (a) the momentless deformation, where the bending deformation is small as compared with the deformation of the middle surface, (b) a mixed deformation, where deformations due to bending and of the middle surface are of the same order, (c) a bending deformation. The author discusses separately the most important cases which are combinations of the type of a shell and various kinds of initial, primary, and secondary deformations, before and at the loss of stability. He also presents simplified equations of neutral equilibrium, the determination of critical loads, discussing in particular shells of revolution.

T. Leser.



Mušťari, H. M., and Surkin, R. G. On the nonlinear theory of the stability of elastic equilibrium of a thin spherical shell under the action of a uniformly distributed normal external pressure. Akad. Nauk SSSR. Prikl. Mat. Meh. 14, 573–586 (1950). (Russian)

The differences between the linear theory of Zoelly and others and experimental results have earlier been thoroughly investigated by several authors but so far no theory has given sufficiently accurate results. The authors revive this question and by keeping higher order terms and using a Ritz method succeed in giving a formula for the critical pressure which agrees better with experiments. The deformation during buckling is supposed to be a local depression which is known to happen in experiments. *F. Niordson.*

Source: Mathematical Reviews, Vol 13 No. 10

MUSHTARI, KH. M.

USSR/Physics - Elastic Equilibrium Nov/Dec 51

"Elastic Equilibrium of Thin Shells With Initial Incorrections in the Form of the Middle Surface," Kh. M. Mushtari, Kazan', Phys Tech Inst, Kazan Affiliate, Acad Sci USSR

"Priklad Matemat i Mekh" Vol XV, No 6, pp 743-750

Derives the fundamental dependences of the theory of equil in thin shells whose median surface possesses initial bucklings (sags) of the order of the thickness of the shell. Considers the stressed state in a flattened (oblate) shell of rotation with positive Gaussian curvature under the action of external

198T99

USSR/Physics - Elastic Equilibrium (Contd) Nov/Dec 51

pressure, in the case where the shell possesses initial imperfection of form. Derives a formula for detg the upper limit of crit pressure. Submitted 8 Mar 51.

198T99

MUSHTARI, Kh. M.

Index
Aeronauticus
March 1954
Strength of
Materials

Determination of Deflections of a Cylindrical Panel Supported by Elastic Non-ductile Ribs and Working under Normal External Pressure

Prikl.Mat.Mekh. 17(6),755-760 1953

Kh.M. Mushtari, I.V. Svirsky U.S.S.R.

In order to solve the problem the equation of compatability of deformations is integrated with the aid of Fourier's method and the equation of equilibrium by the Bubnov-Galerkin method. The value of the upper critical pressure thus obtained tallies well with that obtained by M.A. Koltunov through integrating both equations with the aid of Bubnov-Galerkin method. The value of the lower critical pressure calculated in accordance with Koltunov's formulae, differed considerably due to incorrect fulfilment of the conditions of compatability of deformations. It is also pointed out that the upper critical pressure obtained by the authors lies above its real value, while the lower critical pressure - below, due to an increased number of terms in the series. (Bibl.1)

4 0 0 IN

9-25-54 JPRS

Phys-Tech. Inst. Kazan Affil. AS USSR

MUSHTARI, Kh.M.

USSR

Mushtari, H. M., and Sačenkov, A. V. On stability of cylindrical and conical shells of circular section under the simultaneous action of axial compression and external normal pressure. Prikl. Mat. Meh. 18, 667–674 (1954). (Russian)

The authors apply Galerkin's method to the solution of the equilibrium equations for conical shells and deduce certain approximate formulae for the critical external pressure in the presence of axial compression.

J. R. M. Radok (Providence, R. I.).

MS

62

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 1, p 115 (USSR) 124-57-1-865

AUTHOR: Mushtari, Kh. M.

TITLE: Approximate Determination of the Reduction Coefficient of the Reinforcement of a Fixed Plane and Cylindrical Plate Under Axial Compression (Priblizhennoye opredeleniye reduktsionnogo koeffitsiyenta obshivki podkreplennoy ploskoy i tsilindricheskoy plastinki pri osevom szhatii)

PERIODICAL: Izv. Kazansk. fil. AN SSSR, ser. fiz.-matem. i tekhn. n., 1955, Nr 7, pp 23-35.

ABSTRACT: Examination of the supercriticial deformation of a plate fixed to an orthogonal network of stiffening ribs and compressed in a single direction. The stresses in the central portion of the surface are determined for various degrees of loadings, and the reduction coefficients are determined; all of these reasonings are based on the energy method. One of the alternate solutions relates to the case when the points of the edge of the panel are not displaced relative to the corresponding points of the ribs; in a second alternate the points on the edge of the panel are assumed to slide freely along

Card 1/2

Approximate determination of the Reduction Coefficient (cont.) 124-57-1-865

the ribs. The reduction coefficients found for either alternate are found to be quite similar. Also investigated are large deflections of a circular cylindrical panel, subjected to compression along a generatrix, following a loss of stability. The magnitudes of the lower critical stresses are found for panels having different values of the initial curvature. Theoretical and experimental data pertaining to the reduction coefficients are compared.

1. Plates--Stresses--Mathematical analysis 2. Plates --Deformation--Theory 3. Approximate computations--Applications 4. Cylindrical panels--Deflections--Mathematical analysis

A. S. Vol'mir

Card 2/2

124-57-1-864

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 1, p 115 (USSR)

AUTHORS: Kornishin, M.S., Mushtari, Kh.M.

TITLE: Stability of an Infinitely Long Slanting Cylindrical Panel Under the Action of a Normal Uniform Pressure (Ustoychivost' beskonechno dlinnoy pologoy tsilindricheskoy paneli pod deystviyem normal'nogo ravnomernogo davleniya)

PERIODICAL: Izv. Kazansk. fil. AN SSSR, ser. fiz.-matem. i tekhn. n. 1955, Nr 7, pp 36-50

ABSTRACT: The paper offers a theory of large deflections of an infinitely long, slanting, circular cylindrical panel subjected to the action of a uniform normal pressure from the convex side. The edges of the panel are considered attached; the cases of hinged and fixed attachments of the edges are examined. Equations are written linking the deflection of the panel and the stresses at the center of the surface with the intensity of the load; these relationships appear to be exact within the limits of the assumptions made in the theory of slanting shells. An exact analysis is carried out for the character of the deformation of the panel having differing degrees of curvature. The conditions for the

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Stability of an Infinitely Long Slanting Cylindrical Panel (cont.)

formation of a loop-shaped "deflection-versus-load" curve are found, and the upper and lower values of the loading intensity are indicated. The effect of initial deviations from the circular shape upon the comportment of the panel are evaluated. It is shown than an initial antisymmetrical deflection can strongly influence both the upper and the lower critical loading. Some relationships for the exact solution of the given problem were earlier obtained by I. G. Bubnov [Tr. po teorii plastin (Studies on the Theory of Plates), 1953, pp 282-284].

A. S. Vol'mir

1 Cylindrical planels--Stability--Mathematical analysis --Theory 2 Cylindrical panels

Card 2/2

Mushtari, Kh. M.

USSR/Physics - Shells

FD-1663

Card 1/1 Pub. 85-15/16

Author : Mushtari, Kh. M. (Kazan')

Title : Theory of stability of a spherical shell under the action of an external pressure (in connection with the article of V. I. Feodos'yev of the same title, ibid., Vol. 18, No 1, 1954)

Periodical : Prikl. mat. i mekh., Vol. 19, 251-254, Mar-Apr 1955

Abstract : The author gives a new solution to the problem of the lower critical pressure for a spherical shell, using V. I. Feodos'yev's approximation of the form of buckling by way of the ordinary procedure of integration by the Bubnov-Galerkin method; however, here he applies the principle of possible displacements. It turns out that the solving equation obtained in this way coincides with the equation by the Bubnov-Galerkin method if the left side of the equation integrated is multiplied by the variation of the approximating function. Three references; e.g. Kh. M. Mushtari and R. G. Surkin, "Nonlinear theory of stability of elastic equilibrium of thin spherical shell under the action of uniformly distributed normal external pressure," PMM, Vol 14, No 6, 1950.

Institution : Physicotechnical Institute, Kazan Affiliate of Academy of Sciences USSR

Submitted : March 25, 1954

SOV/124-57-4-4603

Translation from: Referativnyy zhurnal. Mekhanika, 1957, Nr 4, p 105 (USSR)

AUTHOR: Mushtari, Kh. M.

TITLE: Some Mathematical Problems of the Nonlinear Theory of the Stability of Shallow Shells (Nekotoryye matematicheskiye problemy nelineynoy teorii ustoychivosti pologikh obolochek)

PERIODICAL: Tr. 3-go Vses. matem. s"yezda. Vol I. Moscow, AN SSSR, 1956, pp 207-208

ABSTRACT: Bibliographic entry

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SOV/124-58-5-5700

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 5, p 110 (USSR)

AUTHORS: Mushtari, Kh. M., Kornishin, M. S.

TITLE: On the Convergence of the Galerkin Method When Determining the Upper and the Lower Critical Load Limits in a Particular Nonlinear Problem (O skhodimosti metoda Galerkina pri opredelenii verkhney i nizhney kriticheskikh nagruzok v odnoy nelineynoy zadache)

PERIODICAL: Izv. Kazansk. fil. AN SSSR. Ser. fiz.-matem. i tekhn. n., 1956, Nr 10, pp 27-30

ABSTRACT: A shallow cylindrical shell of infinite length subjected to an external uniform pressure is examined. By applying the Bubnov-Galerkin method the authors calculate the upper (P_u) and the lower (P_e) critical loads for the given problem. On the basis of the calculations performed it is demonstrated that in case of a pin-joint-supported shell, for a wide range of shell-parameter variations, the P_u and P_e values can be determined with sufficient accuracy for all practical purposes by the second approximation. In the case of a clamped shell the P_u value is determined with sufficient accuracy by the second approximation,

SOV/124-58-5-5700

On the Convergence of the Galerkin Method (cont.)

while the P_e value requires four approximations. In the two cases mentioned above the Bubnov-Galerkin method approximates the P_e value on the lower side of the true value.

I. I. Vorovich

1. Cylindrical shells--Mechanical properties
2. Cylindrical shells--Mathematical analysis

Card 2/2

Mushtari, Kh. M.

PHASE I BOOK EXPLOITATION 367

Mushtari, Kh. M., and Galimov, K. Z.

Nelineynaya teoriya uprugikh obolochek (The Nonlinear Theory of Elastic Shells) Kazan, Tatkhigoizdat, 1957. 430 p. 1,000 copies printed.

Sponsoring Agency: Akademiya nauk SSR. Kazanskiy filial.

Resp. Eds.: Mushtari, Kh. M., Doctor of Physical and Mathematical Sciences, and Surkin, R. G., Candidate of Technical Sciences; Ed.: Vozdvizhenskaya, M. Kh.; Tech. Eds.: Medel'ko, G. N. and Salikhova, A. S..

PURPOSE: The book is intended for scientific workers, graduate students and engineers working on the design of thin-walled structures. It may be used as a textbook for students of advanced university courses specializing in the theory of elasticity.

COVERAGE: The book deals with the general theory of elastic shells with large displacements and small deformations and with its application in the investigation of the stability and large deflections of the

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elements of thin-walled structures. There are 198 book references, 128 of which are Soviet, 50 English, 20 German. The introduction mentions some Soviet personalities in connection with their publications in the theory of elasticity. They include: Vlasov, V. Z.; Goldenveyzer, A. L.; Lur'ye, A. I.; Lyav, A.; Novozhilov, V. V.; Il'yushin, A. A.; Bubnov, I. G.; and Papkovich, P. F. The authors of this monograph thank their coworkers of the Mechanics Section of the Kazan' Branch of the Academy of Sciences, USSR for their help in the accumulation of material and in the preparation of the manuscript. They include: Kornishyn, M. S; Sachenkov, A. V.; Surkin, R. G., Isahbayeva, F. S., Krivosheyev, N. I.; Ganiyev, N. S. It is mentioned that paragraphs 1, 14-23, 25-26 35-62 were written by Ch. M. Mushtari, paragraphs 2-13, 24, 63-65 by K. Z. Galimov and 27-34 by I. V. Svirskiy.

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The Nonlinear Theory of (Cont.) 367

AVAILABLE: Library of Congress (QA935-M96)

LK/gmp

June 26,1958

Card 10/10

MUSHTARI, Kh. M.

AUTHOR: MUSHTARI Kh.M. 20-1-9/44

TITLE: On the Inverse Boundary Value Problems of the Nonlinear Theory of Flat Shells (Ob obratnykh krayevykh zadachakh nelineynoy teorii pologikh obolochek)

PERIODICAL: Doklady Akad. Nauk SSSR, 1957, Vol.116, Nr.1, pp.35-37 (USSR)

ABSTRACT: Let the medum surface S^0 of a flat thin shell of constant density t be obtained before it is loaded by a normal shift w^0.
The author formulates two problems:
1. For a given S determine an S^0 such that for a given pressure p, given peripheral forces and given boundary conditions the shell assumes a given form.
2. Determine the pressure and strain for given S, w^0, w which satisfy the corresponding boundary conditions.
As an example a problem of the type 1 is considered in detail, where under several simplifying assumptions the sclution is sought in form of a series. The concrete resluts of the very extended calculations are only sketched.

ASSOCIATION: Kazan' Branch of the Acad. Sc. USSR (Kazanskiy filial AN SSSR)
PRESENTED BY: L. I. Sedov, Academician, April 3, 1957
SUBMITTED: February 18, 1957
AVAILABLE: Library of Congress

SOV/179-59-2-15/40

AUTHOR: Mushtari, Kh. M. (Kazan')

TITLE: Bending Theory of Medium Thickness Plates (Teoriya izgiba plit sredney tolshchiny)

PERIODICAL: Izvestiya Akademii nauk SSSR OTN, Mekhanika i mashinostroyeniye, 1959, Nr 2, pp 107-113 (USSR)

ABSTRACT: The classical theory of thin plates may lead to errors of the order of h^2/a^2 compared with unity, where $2h$ is the thickness and a is the width of the plate. In the present paper, terms of this order are retained, and quantities of order h^4/a^4 and higher are neglected. Equations are derived for maximum deflection, bending and twisting moments, and shear forces. Numerical consideration of a supported plate subjected to a sinusoidal load and having $a = 6h$ shows that compared with the accurate solution of Vlasov (Ref 4) the deflection given by the present solution is 2%

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Bending Theory of Medium Thickness Plates

in error, whereas the classical solution is 57% in error. There is 1 table and there are 7 references, of which 5 are Soviet and 2 English.

SUBMITTED: January 6, 1959.

AUTHORS: Mushtari, Kh.M., and Terepuzov, I.G. (Kazan')

TITLE: Theory of Sloping Orthotropic Shells of Medium Thickness

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1959, No. 4, pp 60-67 (USSR)

ABSTRACT: The paper is a continuation of previous works [illegible]. The mathematical equations of the problem are established in section 1 (especially Eq. (1.1), ... and (1.20) - (1.23) and certain terms containing the normal stress in the z direction are shown to be numerically negligible. The boundary conditions are stated in section 3 (especially Eqs (3.1), (3.2) and (3.5)) and the simplified equations specialized to the case of a clamped isotropic shell, for which expressions are derived giving the maximum stress according to the momentless theory (Eq (4.1), Eq (4.2)) and according to the Kirchhoff hypothesis (Eq (4.3), Eq (4.4)). A numerical comparison between these equations is tabulated on page 67; in one instance (at the bottom of page 67) the difference amounts to 20%. In this table,

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Theory of Sloping [illegible] Shell [illegible]

[illegible] Poisson's ratio [illegible] and [illegible]
the principal radii of curvature [illegible]
thickness
There are [illegible]

ASSOCIATION: [illegible]
([illegible])

SUBMITTED: [illegible]

Card 2/2

KURNISHIN, M.S. (Kazan'); MUSHTARI, Kh.M. (Kazan')

Algorithm of a solution of nonlinear problems in the theory of sloping shells. Prikl. mat. i mekh. 23 no.1:159-163 Ja-F '59. (MIRA 12:2)

(Elastic plates and shells)
(Differential equations, Partial)

24.4100

66409

AUTHORS: Mushtari, Kh. M., Teregulov, I. G. SOV/20-128-6-13/63

TITLE: On the Theory of Shells of Moderate Thickness

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 6, pp 1144-1147 (USSR)

ABSTRACT: The authors based their investigations on the principle of virtual displacements to derive the equations for the equilibrium of shells. These equations make it then possible to introduce simplifications of a predetermined accuracy. Moreover, the problem of boundary conditions in the theory of thick plates and shells is solved here. The first equation written down refers to the virtual displacements of a shell (which is assumed to be a three-dimensional body), and the equilibrium equations referred to the nondeformed state are derived next. The static boundary conditions are then specified. Hooke's Law is written down in a generalized form. The authors then investigate the linear problem more thoroughly; the error permissible is of the order of deformation together with an error of the order of magnitude h^2/R^2. Here, R denotes the smaller radius of curvature of the surface, h being a constant. The computation course

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On the Theory of Shells of Moderate Thickness SOV/20-128-6-13/63

is followed up step by step. The equations derived here were applied to the solution of problems concerning the flexure of a circular plate with a radius a, and a rigid central disk with radius b under the action of a unilateral uniform pressure q in the region $b \leqslant r \leqslant a$ and the force Q applied to the disk. Some results are summarized in a table. The investigation under review was completed by Teregulov under the supervision of Kh. M. Mushtari. There are 1 table and 6 references, 5 of which are Soviet.

ASSOCIATION: Kazanskiy khimiko-tekhnologicheskiy institut im. S. M. Kirova (Kazan' Institute of Chemical Technology imeni S. M. Kirov)

PRESENTED: June 19, 1959, by Yu. N. Rabotnov, Academician

SUBMITTED: June 10, 1959

Card 2/2

MUSHTARI, Kh. M.

report presented at the 1st All-Union Congress of Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb '60.

201. G. Ia. Mikhailov (Moscow): An experimental study of the load carrying capacity of thin-walled nickel tubes subjected to various combinations of tension, torsion, and internal pressure.

202. S. G. Mikhlin (Leningrad): Variational methods in the theory of elasticity.

203. A. A. Movchan (Moscow): The stability of motions of solids — Lagrange's theorem for solids and its inversion.

204. A. A. Movchan (Moscow): Axisymmetric hypersonic flutter of a circular cylindrical shell.

205. N. F. Morozov (Leningrad): On the uniqueness of the solution of the problem of large deflections of a circular plate under rotationally symmetric loading.

206. G. N. Mukhadze (Tbilisi): The determination of the deformation of trusses without diagonals.

207. Kh. M. Mushtari, I. G. Teregulov (Kazan): A theory of moderately thick plates and shells.

208. A. G. Nazarov (Erevan): Some problems in the theory of seismic stability.

209. U. K. Nigul (Tallin): Vibrations of an elastic circular cylindrical shell under concentrated impact loading.

210. U. K. Nigul (Tallin): More accurate equations of motion for circular cylindrical shells.

211. V. A. Nikitin (Leningrad): Approximate treatment of cylindrical shells under concentrated loads.

212. G. B. Nikiforov (Moscow): Redistribution of reactions at the edge of a simply supported rectangular plate under gradually increasing loading.

213. W. Nowacki (Warsaw): Some dynamical problems of thermoelasticity.

214. G. I. Bozhkov (Moscow): Investigation of the viscous behavior of elastic, visco-plastic materials in vibrations.

215. Ia. L. Nudel'man, L. A. Slastinger (Odessa): Problems of the non-linear theory of elasticity.

216. I. F. Obraztsov (Moscow): An application of the variational method to the design of [illegible] structures.

217. K. I. Ogurtsov (Leningrad): Complete computation of a wave field in homogeneous elastic media with parallel plane boundaries.

218. H. Okubo (Nagoia): The method of electroplating and its applications.

219. W. Olszak (Warsaw): Two-dimensional problems in the theory of plasticity of non-homogeneous and anisotropic media.

220. V. G. Osipov (Moscow): The state of stress in a deformed curved bar.

221. V. Ia. Pavilainen (Leningrad): A membrane theory for a toroidal shell.

222. V. P. Pavlov (Moscow): Creep, elastic properties and anisotropy of plastic lubricants.

223. O. V. Palchinskii (Kharkov): A practical method of designing reinforced concrete structures with reference to creep.

224. Ia. G. Panovko (Riga): The problem of structural damping.

225. P. I. Perlin (Moscow): An approximate method for solving elastic-plastic problems.

226. P. I. Perlin, L. A. Shofman (Moscow): Application of the theory of rigid, plastic solids to problems of metal forming.

227. G. N. Polozhii (Kiev): On the axisymmetric problem of the theory of elasticity.

228. D. E. Polshin (Moscow): A method for studying the plane field of relative volume strains in soils.

229. G. Ia. Popov (Novosibirsk): The application of some new methods of the theory of integral equations to the solution of contact problems of the theory of elasticity.

230. V. A. Postnov (Leningrad): Free and forced vibrations of frames taking into account shear deformations and energy dissipation.

231. V. N. Poturaev (Dnepropetrovsk): Investigation and calculation of internal friction in elastic members of vibrating machines.

232. W. Prager (Providence): An elementary discussion of definitions of stress rate.

233. N. I. Prigorovskii (Moscow): Photoelastic investigation of stresses in three-dimensional layered models.

Mushtari, Kh. M.

report presented at the 1st All-Union Congress of Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb '60.

68. N. S. Ganeeva, Kh. M. Mushtari, R. G. Surkin (Kazan): On a method of solving [illegible] of the bending theory of shallow shells with the use of electronic digital computers.

69. G. T. Gasanov, S. G. Gurbanov (Baku): Solution of unsteady problems of hydrodynamics of viscous and visco-plastic fluids.

70. A. V. Gemmerling (Moscow): An approximate stability analysis of frames in the elastic-plastic range.

71. G. A. Genkin (Moscow): Some problems concerning the plane flow of compressible plastic media.

72. S. P. Gevorkian (Erevan): On a problem of elastic-plastic torsion of an anisotropic shaft.

73. I. S. Gernstein (Moscow): A dynamic problem for a conical shell.

74. M. V. Gzovskii (Moscow): Tectonophysics — a new domain of application of mechanics to geological problems.

75. M. V. Gzovskii, D. Gookina (Moscow): Simulating of processes of plastic deformation and rupture of solids with great variations of time and size.

76. V. S. Gimmelfarb (Moscow): Development of a theory of pressure in rocks with the use of the methods of continuum mechanics.

77. I. I. Golberg (Moscow): Some generalizations of the basic equations of visco-elasticity.

78. I. I. Golberg (Moscow): The propagation of longitudinal waves in a visco-elastic rod.

79. A. M. Goldberg, V. G. Korotkin (Leningrad): Theoretical and experimental methods of design of the locks of the Stalingrad hydroelectric power plant.

80. I. I. Goldenblat (Moscow): A generalized theory of plastic flow.

81. I. I. Goldenblat (Moscow): The theory of finite deformations of anisotropic elastic media.

82. I. I. Goldenblat, N. A. Nikolaenko (Moscow): A general creep theory of shells.

83. A. L. Goldenveiser (Moscow): Development of the theory of thin elastic shells.

84. A. L. Goldenveiser (Moscow): Asymptotic integration of the equations of the theory of thin elastic plates.

85. M. I. Gorbunov-Posadov (Moscow): Determination of the elastic zone boundary in a sand foundation, which approaches failure under the pressure of a rigid footing.

86. A. Ia. Gorgidze (Tbilisi): On secondary effects in torsion and bending of nearly prismatic bars.

87. L. V. Goralik (Leningrad): On filtration force and viscous friction in water-saturated sand under dynamical conditions.

88. G. A. Goryachko, G. N. Savin (Kiev): Contribution to the dynamics of inelastic one-dimensional continua of variable length.

89. A. S. Grigoriev (Moscow): On elastic-plastic deformation of non-homogeneous plates and disks.

90. A. S. Grigoriev (Moscow): Equilibrium of membrane shells of revolution for large displacements and strains.

91. G. S. Grigorian (Erevan): Creep design of thin orthotropic sandwich shells.

92. S. S. Grigorian (Moscow): The general equations of soil dynamics and some particular solutions.

93. D. V. Grilitskii (Lvov): Torsion of an elastic layer.

94. A. N. Grubin (Leningrad): Stress concentration in notched tension strips under large creep deformations.

95. V. S. Gubenko, V. I. Mossakovskii (Dnepropetrovsk): The pressure of an annular die on an elastic half space.

96. I. I. Gudushauri (Tbilisi): Effect of shear stresses in the design of foundation strips of arbitrary rigidity under arbitrary loads.

97. S. O. Gulkanian (Erevan): The bending of a hollow prismatic rod with a rectangular hole.

98. A. N. Gutkin (Moscow): The limit equilibrium of an elastic-plastic disc that is compressed between rough rigid plates.

99. S. G. Gutman (Leningrad): A plane multiply-connected region subjected to a conservative body force and non-uniform heating.

100. S. G. Gutman (Leningrad): The equilibrium of a hollow cone under its own weight and hydrostatic pressure on one of its surfaces when the axis of the cone has an arbitrary orientation.

101. V. M. Darevskii, P. I. Kaznakii (Moscow): Buckling of cylindrical cantilever shell with ring-stiffened edge under internal pressure.

24 4266

S/124/61/000/008/033/042
A001/A101

AUTHORS: Mushtari, Kh. M., Surkin, R. G.

TITLE: The average bending of a sloping spherical panel, square in plane, at nonlinear stress-strain relation

PERIODICAL: Referativnyy zhurnal. Mekhanika, no. 8, 1961, 7, abstract 8V49 ("Zh. prikl. mekhan. i tekhn. fiz.", 1960, no. 2, 162-165)

TEXT: The problem whose content is described in the title is solved. The stress-strain relation is assumed in the form:

$$\sigma_i = E_o e_i (1 - \gamma e_i^2),$$

where γ is a certain constant. The equations derived become a somewhat more complicated in comparison with conventional equations for large deflections of panels. The subsequent solution is carried out according to Bubnov-Galerkin's method. Cumbersome arithmetical operations are transferred to a "Strela" computer. The degree of effect of physical non-linearity on the magnitude of arising stresses is numerically estimated.

[Abstracter's note: Complete translation] F. Feodos'yev

Card 1/1

S/179/60/000/006/031/036
E081/E135

11.2312

AUTHOR: Mushtari, Kh.M., (Kazan')

TITLE: The Applicability of Different Theories of Three-Ply Plates and Shells

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1960, No. 6, pp. 163-165

TEXT: Various authors have suggested and developed the following theories of layered plates and shells: 1) the theory based on the assumption that the Kirchhof hypothesis is applicable to single layered plates (Ref.1); 2) the theory of plates and shells containing a filling, based on the assumptions (a) the thickness of the loaded layers, formed from materials with high mechanical characteristics, is small in comparison with the thickness of the middle layer containing the filling of weak material, (b) an element of the filler normal to the middle surface of the shell before deformation remains rectilinear after deformation, (c) the design of the bearing layers can be carried out on the basis of the Kirchhof hypothesis (Refs 2, 3);

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E081/E135

The Applicability of Different Theories of Three-Ply Plates and Shells

3) the theory based on the assumptions (a) that the influence of the normal stress σ_3 on the magnitude of the principal stresses can be neglected, (b) the change in magnitude of deflection with thickness of shell can be neglected, (c) the shear displacements are determined from those expressions for transverse shears e_{xz}, e_{yz}, which are obtained if the stresses τ_{xz}, τ_{yz} in each layer are assumed equal to the corresponding magnitudes found as a first approximation by applying the Kirchhof hypothesis to each section of the layers. The region of applicability of the theories is discussed using the notations: ϵ = permissible error relative to unity; E, G_{13}, 2h, = elasticity modulus, modulus of transverse shear and thickness of the filler layer; $\sigma_x, \ldots\ldots, \tau_{yz}$ are components of stress in the filler; corresponding quantities in the bearing layers are denoted by primes; a is a characteristic dimension of the shell. The coefficient of variability of the deformed state (λ) and the quantity η characterising the degree of thinness of the shell and the degree of variability of its

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The Applicability of Different Theories of Three-Ply Plates and Shells

deformation on the middle surface $z = 0$ are given by:

$$\partial f/\partial x \sim \lambda f/a, \qquad \eta = \lambda^2 h^2/a^2 \tag{1}$$

where f is a quantity characterising the deformation, displacement or stress; the symbol $\sim$ signifies that the quantities compared are of identical order on the middle surface, assumed to be the middle layer of the filling. The relative geometrical and mechanical characteristics of a three-ply plate are determined by the positive quantities r, s, t

$$h'/h \sim \varepsilon^r, \qquad E/E' \sim \varepsilon^s, \qquad \eta \sim \varepsilon^t \tag{2}$$

The usual equilibrium equations of the filler and bearing layers are given by:

$$\sigma_{x,x} + \tau_{xy,y} + \tau_{xz,z} = 0, \ldots \qquad (-h \lesssim z \lesssim h) \tag{3}$$

and

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E081/E135

The Applicability of Different Theories of Three-Ply Plates and Shells

$$\sigma_{x,x}' + \tau_{xy,y}' + \tau_{xz,z}' = 0, \quad (h \leqslant z \leqslant h + 2h') \quad (4)$$

where the commas before the suffixes denote partial differentiation. The mathematical development and analysis of the three theories leads to the following principal conclusions for a thin shell: (a) if $r \geqslant s$. $h'/h \lesssim E/E'$, then theory 2) is inapplicable; since condition (9) is not fulfilled and the influence of transverse shear on the magnitude of the deflection is negligibly small and, in this case, theory 1) is applicable: (b) if $s = r + 1$, for example, $h'/h \sim \sqrt{\varepsilon}$, $E/E' \sim \varepsilon^{3/2}$, then theory 2) is applicable and the correction to the deflection is of the same order as that determined by theory 1): (c) if $s > r + 1$, theory 2) is applicable: (d) if $s = r + 1/2$, $h'\sqrt{\varepsilon}/h \sim E/E'$, the filler can be termed rigid, and theory 2) is applicable.

There are 5 references: 4 Soviet and 1 English.

SUBMITTED: May 7, 1960

Card 4/4

MUSHTARI, Kh.M.; SURKIN, R.G.

Transverse flexture of a supported square plate assuming [illegible] ear [illegible]

Sof[illegible] tekh.nauk no.14:23-33 (MIRA 14:11).
(Steel and chrome
(Elastic plates and shells)

Mushtari, Kh. M.

BOROVSKIY, P. V.

PHASE I BOOK EXPLOITATION SOV/6206

Konferentsiya po teorii plastin i obolochek. Kazan', 1960.

Trudy Konferentsii po teorii plastin i obolochek, 24-29 oktyabrya 1960. (Transactions of the Conference on the Theory of Plates and Shells Held in Kazan', 24 to 29 October 1960). Kazan', [Izd-vo Kazanskogo gosudarstvennogo universiteta] 1961. 426 p. 1000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Kazanskiy filial. Kazanskiy gosudarstvennyy universitet im. V. I. Ul'yanova-Lenina.

Editorial Board: Kh. M. Mushtari, Editor; F. S. Isanbayeva, Secretary; N. A. Alumyae, V. V. Bolotin, A. S. Vol'mir, N. S. Ganiyev, A. L. Gol'denveyzer, N. A. Kil'chevskiy, M. S. Kornishin, A. I. Lur'ye, G. N. Savin, A. V. Sachenkov, I. V. Svirskiy, R. G. Surkin, and A. P. Filippov. Ed.: V. I. Aleksagin; Tech. Ed.: Yu. P. Semenov.

PURPOSE: The collection of articles is intended for scientists and engineers who are interested in the analysis of strength and stability of shells.

Card 1/14

Transactions of the Conference (Cont.) SOV/6206

COVERAGE: The book is a collection of articles delivered at the Conference on Plates and Shells held in Kazan' from 24 to 29 October 1960. The articles deal with the mathematical theory of plates and shells and its application to the solution, in both linear and nonlinear formulations, of problems of bending, static and dynamic stability, and vibration of regular and sandwich plates and shells of various shapes under various loadings in the elastic and plastic regions. Analysis is made of the behavior of plates and shells in fluids, and the effect of creep of the material is considered. A number of papers discuss problems associated with the development of effective mathematical methods for solving problems in the theory of shells. Some of the reports propose algorithms for the solution of problems with the aid of electronic computers. A total of one hundred reports and notes were presented and discussed during the conference. The reports are arranged alphabetically (Russian) by the author's name.

Card 2/14

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24536
S/179/61/000/002/001/017
E081/E141

AUTHOR: Mushtari, Kh.M., (Kazan')

TITLE: The general theory of shallow sandwich-type shells

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1961, No.2, pp. 24-29

TEXT: In the work so far carried out on the theory of 3-ply shallow sandwich-type shells, it has been assumed that the shell is of symmetrical construction. This assumption limits the region of applicability of the theory. If, for instance, the temperatures of the bearing layers (the two outside layers) are different, or if the permitted stresses in these layers differ in compression and tension, it is reasonable to take the bearing layers as having different thicknesses, and as being constructed of different materials. The paper develops the general theory of shallow shells so as to allow for temperature effects and for unsymmetrical construction. It is assumed that the normal component of the displacement of the shell (the displacement in the z direction) is independent of z, and that the Kirchhof hypothesis is applicable to the bearing layers

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E081/E141

The general theory of shallow sandwich-type shells

in view of their high mechanical strength. The filler (the midile layer) is assumed weak in shear, and all the layers are assumed thin. On the basis of these assumptions, equations are given for membrane stresses and for bending and twisting moments. Taking into account the equilibrium equations and the work of deformation of the filler and the bearing layers, the equations governing the behaviour of the shell are obtained. Particular cases of these equations are considered as follows: a shell with very thin bearing layers; a shell with a very pliable filler; a cylindrical shell; and a shell with isotropic layers. In the latter case, the system of basic equations reduces to three equations relating to the deflection, stress and shear functions.
There are 4 references: 3 Soviet and 1 English.
The English language reference reads:
Ref.1: E. Reissner. Small bending and stretching of sandwich-type shells. NACA, Technical Notes, 1949, No. 1832.
ASSOCIATION: Kazanskiy filial Akademii nauk SSSR
(Kazan' Branch, Academy of Sciences, USSR)
Card 2/2
SUBMITTED: May 7, 1960

S/879/62/000/000/001/088
D234/D308

AUTHOR: Mushtari, Kh. M. (Kazan')

TITLE: Some nonlinear problems of the theory of elasticity and effective methods of solving them

SOURCE: Teoriya plastin i obolochek; trudy II Vsesoyuznoy konferentsii, L'vov, 15-21 sentyabrya 1961 g. Kiev, Izd-vo AN USSR, 1962, 7-15

TEXT: A review article dealing with basic dependences of the theory of single-layer and multi-layer shells, large deflections of thin-walled rods, inverse boundary problems of the nonlinear theory of shells, semi-nonlinear theory of bending of shallow shells, method of finite differences and other methods of solution. There are 69 references.

Card 1/1

S/879/62/000/000/015/088
D234/D308

AUTHOR: Mushtari, Kh. M. (Kazan')

TITLE: An improvement of the approximate theory of three-layer plates with filler

SOURCE: Teoriya plastin i obolochek; trudy II Vsesoyuznoy konferentsii, L'vov, 15-21 sentyabrya 1961 g.Kiev, Izd-vo AN USSR, 1962, 128-131

TEXT: The author assumes the approximate solution in the form

$$u = u_0 + zu_1 + z^2u_2, \quad v = v_0 + zv_1 + z^2v_2, \quad w = w_0 + zw_1 \qquad (1)$$

where u_0, v_0, w_0 are displacements of the middle plane of the filler. For a light filler one of the equations of equilibrium is replaced by

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$$\tau_{xz,z} = 0, \quad \tau_{xz} = \varphi_x(x,y) = G_{13}(u_{,z} + w_{,x}). \quad (xy) \qquad (5)$$

and it is proposed to equate only the values of σ_z averaged over the thickness. The equations are formulated in terms of displacements and a square plate, subject to compressing forces uniformly distributed along the edges, is considered as an example. Numerical results are compared with those of A. P. Prusakov; the correction is as large as 25% in some cases. There is 1 table.

S/879/62/000/000/060/088
D234/D308

AUTHORS: Mushtari, Kh. M. and Nikiforov, M. Ye. (Kazan')

TITLE: Medium bending of a flexible, very shallow shell of double curvature, with rectangular horizontal section and hinged edge

SOURCE: Teoriya plastin i obolochek: trudy II Vsesoyuznoy konferentsii, L'vov, 15-21- sentyabrya 1961 g. Kieg, Izd-vo AN USSR, 1962, 350-352

TEXT: The authors have solved the above problem for the case of uniformly distributed transverse load, using semi-nonlinear theory of medium bending, and assuming that the deflection does not exceed the double thickness. The system of algebraic equations obtained by the method of Bubnov-Galerkin is not given, being excessively complicated. Membrane stresses at the center of the shell and of the edges, flexural stresses at the center, torsional stresses at the corners and dimensionless deflection at the center were computed. Numerical calculations were made on a Ural-1 computer,

Medium bending of ...

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D234/D308

for a square panel and a panel of double length. Tabulated data and graphs are to be included in a reference book which is in preparation.

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37146
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E081/E535

24 4200

AUTHOR: Mushtari, Kh.M. (Kazan')

TITLE: One refinement of the approximate theory of sandwich plates with filler core

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Mekhanika i mashinostroyeniye, no.1, 1962, 125-130

TEXT: The paper is a continuation of previous work (Ref.3: Izv. AN SSSR, OTN, Mekhanika i mashinostroyeniye, 1960, No.6). In the theory of thin single layer plates, it is usual to assume that stresses normal to the surface have a negligible effect on the stresses parallel to the surface. On the other hand, it has been assumed in some previous works that in a light filler stresses parallel to the surface have negligible effect on sag. This assumption applies if the moduli of elasticity of the core are small in the direction of the plane in comparison with the modulus in the transverse direction. However, intermediate cases can arise in which all stresses are of the same order of magnitude. The paper gives a refinement of the theory

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which includes this case. The layers are assumed to be orthotronic with compressible core; the displacements in the filler core are expressed approximately as cubic equations in z and in terms of the displacements at the middle plane, and the displacements in the upper and lower layers are written in accordance with the Kirchhoff hypothesis of deformation. Allowing for skew symmetric and symmetric bending, for the equilibrium equations and for the compatibility of displacements at the upper and lower surfaces of the core, equations are obtained for stresses, bending and displacement in the bearing layers. The compression of a square plate with freely supported edges by a force uniformly applied to all edges is discussed, and it is found that if stresses parallel to the surface are neglected, it gives as an answer a substantially lower critical stress corresponding to plate failure. For a material with Poisson's ratio of 0.4, the lowering amounts to 25%. There is 1 table.

SUBMITTED: September 11, 1961

Card 2/2

MUSHTARI, Kh.M. (Kazan')

Theory of sandwich shallow shells with filler layers of variable thickness. Izv.AN SSSR.Otd.tekh.nauk.Mekh. i mashinostr. no.4: 71-76 Jl-Ag '62. (MIRA 15:8)

1. Kazanskiy filial AN SSSR.
(Elastic plates and shells)

MUSHTARI, Kh.M. (Kazan')

Area of the application of approximate theories of sandwich plates with nonsymmetric structure and a filler. Izv.AN SSSR.Mekh. i mashinostr. no.5:176-178 S-O '63. (MIRA 16:12)

KORNISHIN, M.S.; MUSHTARI, Kh.M., prof., doktor fiz.-mat. nauk, otv. red.

[Nonlinear problems in the theory of plates and shallow shells and methods for their solution] Nelineinye zadachi teorii plastin i pologikh obolochek i metody ikh resheniia. Moskva, Izd-vo "Nauka," 1964. 191 p. (MIRA 17:6)

L 25637-65 EWA(h)/EWP(j)/EWP(k)/EWT(d)/EWT(m)/EWA(d)/EWP(w)/EWP(v)
Pc-4/Pf-4/Peb EM/JAJ/RM
ACCESSION NR: AP5005180 S/0179/64/000/006/0119/0124

AUTHOR: Mushtari, Kh. M. (Kazan); Teregulov, A. G. (Kazan)

TITLE: On buckling of sandwich shells with elastoviscous cores

SOURCE: AN SSSR. Izvestiya. Mekhanika i mashinostroyeniye, no. 6, 1964, 119-124

TOPIC TAGS: shell buckling, sandwich shell buckling, spherical shell buckling, cylindrical shell buckling, local buckling, local shell buckling

ABSTRACT: The local buckling of shallow symmetric sandwich shells with a core of light material is discussed. The Kirchhoff hypothesis is applied to the face layers and the hypothesis on straightness of normals, to the core, in deriving the equilibrium equations with boundary conditions, and equations for local buckling, as well as expressions for determining the stresses in face layers and in the core. The stability of a cylindrical medium-length sandwich shell under axial compression and uniform external pressure is analyzed and the symmetrical and asymmetrical modes of buckling are examined. The problem of local buckling of a spherical sandwich shell under external uniform pressure is also discussed. Orig. art. has: 24 formulas. [VK]

ASSOCIATION: none

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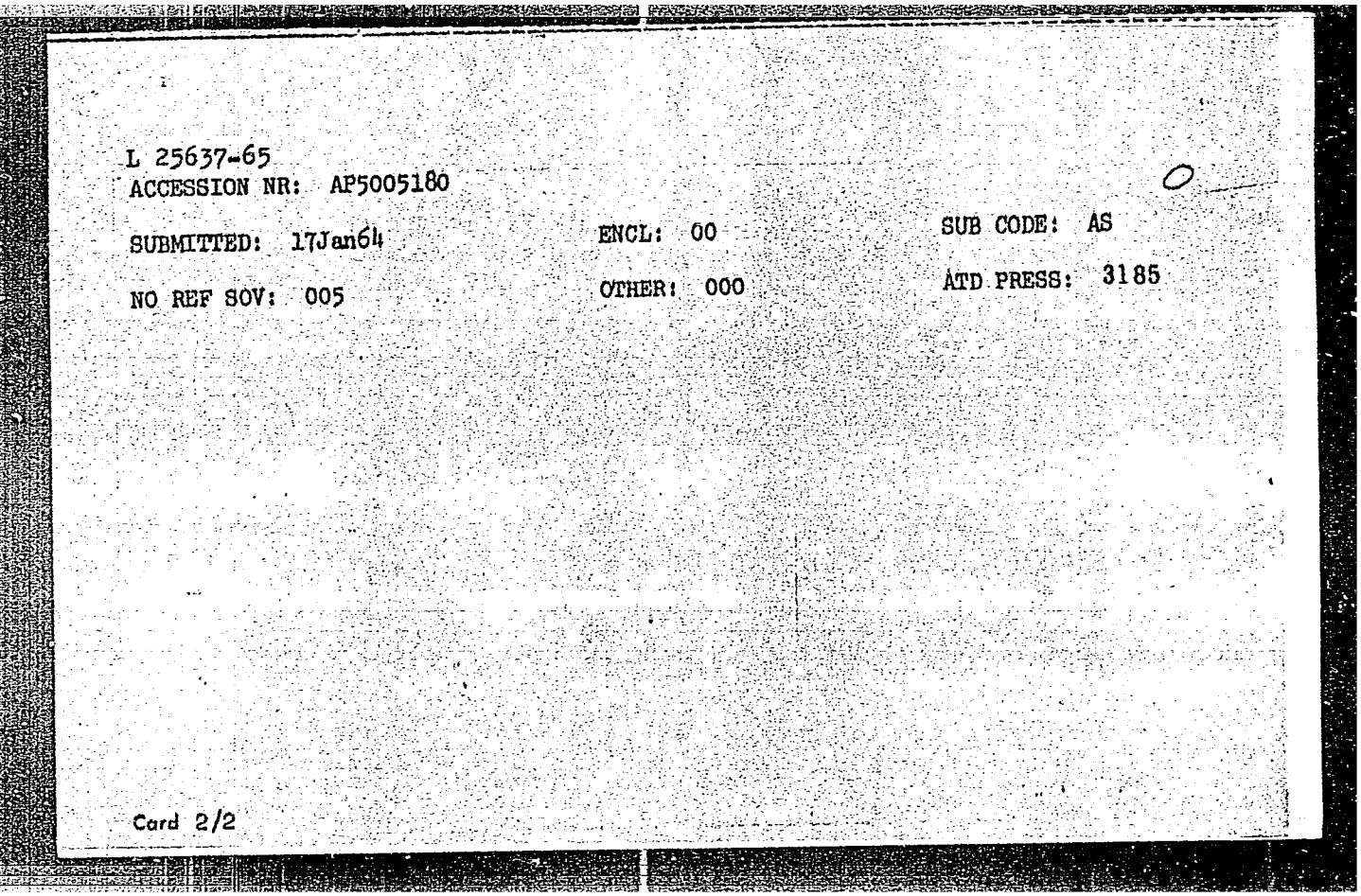

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ACCESSION NR: AP5005180

SUBMITTED: 17Jan64 ENCL: 00 SUB CODE: AS

NO REF SOV: 005 OTHER: 000 ATD PRESS: 3185

Card 2/2

ACCESSION NR: AP4026953 S/0258/64/004/001/0045/0049

AUTHOR: Mushtari, Kh. M. (Kazan)

TITLE: Theory of flexure of a rectangular plate of variable thickness

SOURCE: Inzhenerny*y zhurnal, v. 4, no. 1, 1964, 45-49

TOPIC TAGS: flexure theory, rectangular plate, variable thickness plate, square plate, uniformly distributed transverse load, maximum stress intensity, maximal deflection, freely supported boundary, Poisson coefficient

ABSTRACT: The author studies the effect of a uniformly distributed transverse load p applied to a square plate of variable thickness 2h on flexure. He is concerned with determining a law for varying the thickness to achieve minimum volume for the plate, given a maximum value for the stress intensity or maximal deflection. This law is approximated by

$$f^2 = \cos\xi\cos\eta + a_{13}(\cos\xi\cos 3\eta + \cos 3\xi\cos\eta) + a_{33}\cos 3\xi\cos 3\eta, \quad (1)$$

and is, in the ideal case,

$$f = \left(\frac{16}{9}\right)^{1/6}\cos\xi\cos\eta. \quad (2)$$

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ACCESSION NR: AP4026953

The deflections are assumed small, the deformations elastic, and the boundary of the plate freely supported. The author is indebted to N. K. Galimov for programing this problem. Orig. art. has: 25 formulas.

ASSOCIATION: none

SUBMITTED: 20Jun63 DATE ACQ: 15Apr64 ENCL: 00

SUB CODE: AP NO REF SOV: 000 OTHER: 000

Card 2/2

MUSHTARI, Kh.M. (Kazan')

An inverse problem in the theory of the bending of [illegible] plates of variable thickness. Izv.vuz.; mat. 4 no.3:510-515 '16. (MIRA 17:10)

L 51484-65 EWP(k)/EWA(h)/EWT(d)/EWT(m)/EWA(d)/EWP(w)/EWP(v) Pf-4/Peb EM/WW

ACCESSION NR: AP5014819 UR/0198/65/001/005/0001/0005

22
AUTHOR: Mushtari, Kh. M. (Kazan) 21
B

TITLE: On a theory of sandwich plates and shells which accounts for the physical nonlinearity of the core

SOURCE: Prikladnaya mekhanika, v. 1, no. 5, 1965, 1-5

TOPIC TAGS: sandwich plate, sandwich shell, sandwich construction, nonlinear sandwich core 24 24 24

ABSTRACT: The stress-strain relationships are examined in sandwich plates and shells with the face layers made of linearly elastic material and the core layer of a soft, nonlinearly elastic material (or of linearly elastic material stressed beyond its elastic limit); the compressibility of plates and shells in the normal direction is neglected. Such conditions can take place in bending of sandwich plates and shells. The formulas derived in the author's article "On the general theory of shallow shells with a core" (Izvestiya AN SSSR, Seriya Mekhanika i mashinostroyeniye, no. 2, 1961) for a case of a physically elastic core are used here and generalized nonlinear expressions for components of the transverse shear are introduced into them. The flexure of a circular sandwich plate of symmetrical

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ACCESSION NR: AP5014819

construction under continuous uniform pressure is analyzed as an example, assuming that all layers are isotropic and that the flexural rigidity of the face layers relative to their middle surfaces is negligible. Expressions are given for radial and hoop forces and for flexural moments, as well as for displacements. These expressions are adapted in the case of an annular plate with a simply supported outer edge and free inner edge; three alternatives of possible physical relationships between linear and nonlinear stress and strain components of the transverse shear are considered. The case of a plate clamped along the outer edge is also considered. The results are discussed and compared with those calculated for a plate with a core made of material with a linear stress-strain characteristic. [VK]
Orig. art. has: 26 formulas.

ASSOCIATION: Kazanskiy fiziko-tekhnicheskiy institut (Kazan' Physicotechnical Institute)

SUBMITTED: 11Aug64 ENCL: 00 SUB CODE: AS

NO REF SOV: 002 OTHER: 000 ATD PRESS: 4017

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Card 2/2 mo

L 63268-65 EWT(d)/EWT(m)/EWP(w)/EWP(k) Pf-4 EM

ACCESSION NR: AP5016239 UR/0373/65/000/003/0145/0148

AUTHORS: Il'gamov, M. A. (Kazan); Mushtari, Kh. M. (Kazan)

TITLE: Temperature stability of three-layer plates with clamped edges

SOURCE: AN SSSR. Izvestiya. Mekhanika, no. 3, 1965, 145-148

TOPIC TAGS: plate stability, thermal stress, thermal deformation

ABSTRACT: The nomenclature and equations of Kh. M. Mushtari (K obshchey teorii pologikh obolochek s zapolnitelem. Izv. AN SSSR, OTN, Mekhanika i Mashinostroyeniye, 1961, No. 2) were used to study the temperature stability of round and rectangular composite plates clamped at the edges and consisting of two load-carrying isotropic layers of different mechanical and thermal properties (and thicknesses) separated by a low conductivity isotropic filler. The equation for this geometry was derived as

$$\left[(s'-s'')^2-\frac{2h}{G}T\right]\Delta\Delta w=-\left(\frac{1}{B'}+\frac{1}{B''}\right)T\Delta w \qquad (1)$$

(where $s'-s''=2h+h'+h''$; $2h$, $2h'$, $2h''$ = thickness of layers, G = shear modulus of filler; $B'=B_1'=B_2'$, $B''=B_1''=B_2''$ = layer stiffness). After assuming constant temperatures τ' and τ'' in the load carrying layers, a linear temperature distribution in the filler and a linear temperature dependence of the elastic and

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ACCESSION NR: AP5016239

shear moduli the equation (1) was modified to find the critical combinations of $\lambda'\tau'$ and $\lambda''\tau''$ for the case of round and rectangular clamped plates. These equations are best solved graphically. The question of layer thicknesses for minimum weight was also considered. The weight was expressed in terms of the material parameters and geometry and minimized with respect to the layer thicknesses, yielding a working equation for determining the layer thickness giving minimum weight for thermal stability under given conditions. It is claimed that the equation gives excellent results (no examples). Orig. art. has: 26 formulas and 1 figure.

ASSOCIATION: none

SUBMITTED: 20May63 ENCL: 00 SUB CODE: TD, ME

NO REF SOV: 004 OTHER: 001

Card 2/2

L 00755-67 EWP(k)/EWT(d)/EWT(m)/EWP(w)/EWP(v) IJP(c) EM/WW

ACC NR: AP6024192 SOURCE CODE: UR/0424/66/000/002/0145/0149

AUTHOR: Mushtari, Kh. M. (Kazan') 31 B

ORG: none

TITLE: Fundamental relations in the theory of elastic three-layered shells of variable stiffness 24

SOURCE: Inzhenernyy zhurnal, Mekhanika tverdogo tela, no. 2, 1966, 145-149

TOPIC TAGS: elasticity theory, shell theory, sandwich structure

ABSTRACT: Fundamental relations are derived in the theory of elastic sandwich structures under the following three assumptions: a) the thickness of the load-carrying layers as well as of the filler varies smoothly; b) the elasticity modulus of the load-carrying layers is constant along the thickness but varies smoothly along the surface; c) the elasticity modulus for the filler varies smoothly along the surface as well as along the thickness. The equations of equilibrium and the boundary conditions remain the same as those outlined in the author's previous paper (K obshchey teorii pologikh obolochek s zapolnitelem. Izv. AN SSSR, Mekhanika i mashinostroyeniye, 1961, No. 2). The case is studied for cylindrical deflection of sandwich plates with variable stiffness, freely supported at the edges, under a transverse load. Expressions are also derived for the deflection of variable stiffness cantilever plates under similar loading conditions. Finally, the following equation is obtained

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ACC NR: AP6024192

for the maximum deflection of circuler sandwich plates of variable stiffness, constructed symmetrically under transverse loads

$$\frac{w^{*}_{max}}{w_{max}} = 1 - \frac{0.2\gamma}{1+\gamma} \quad \left(\begin{matrix}\nu=0.3\\ p_1=0\end{matrix}\right), \qquad \frac{w^{*}_{max}}{w_{max}} = 1 - \frac{0.28\gamma}{1+\gamma} \quad \left(\begin{matrix}\nu=0.3\\ p_1=-p_2\end{matrix}\right),$$

$$w^{*}_{max} = w_{max} \text{ at } \gamma = 0, \qquad 0.8 > w^{*}_{max}/w_{max} > 0.74 \text{ at } \gamma = \infty.$$

Orig. art. has: 34 equations.

SUB CODE: 20/ SUBM DATE: 20Mar64/ ORIG REF: 002

Card 2/2

L 10436-67 EWT(d)/EWT(m)/EWP(w)/EWP(v)/EWP(k) IJP(c) WW/EM
ACC NR: AT6032964 SOURCE CODE: UR/3228/64/000/002/0035/0047

AUTHOR: Galimov, N. K.; Mushtari, Kh. M. 38

ORG: none

TITLE: Theory of three-layer plates and shells

SOURCE: Kazan. Universitet. Issledovaniya po teorii plastin i obolochek, no. 2, 1964, 35-47

TOPIC TAGS: metal stress, shell deformation, metal deformation

ABSTRACT: The authors derive equations for equilibrium and the conditions for joint deformations of the slanting shell of an asymetric structure, considering the transversal deformation of the filler. The tangential and normal displacements of the middle surface of the filler, a shear function, and the transversal deformation of the filler are taken as variables. The filler displacements are approximated by a power expansion of the normal coordinate. The buckling is approximated by a linear function and the tangential displacements by a quadratic one. The filler shears are assumed to be constant along the thickness. The stresses are reduced to the middle filler surface; the deformations are assumed to be small, and the budding finite. The problem of stability of a cylindrical shell with orthotropic filler with reduction, and with a rigid isotropic filler without reduction is solved. Orig. art. has: 42 equations.

SUB CODE: 11,20/ SUBM DATE: --Jun63/ ORIG REF: 011

Card 1/1

L 10616-65 EWP(w)
ACCESSION NR: AP4043524 S/0258/64/004/003/0510/0515

AUTHOR: Mushtari, Kh. M. (Kazan) B

TITLE: On the inverse problem in the theory of flexure of variable-thickness elastic plates

SOURCE: Inzhenernyy zhurnal, v. 4, no. 3, 1964, 510-515

TOPIC TAGS: elastic plate, elliptic plate, circular plate, variable thickness plate, minimum volume plate, minimum weight plate

ABSTRACT: The problem of determining a plate thickness variation law, such that a certain given shape of elastic surface under a given load is an exact solution of the flexure problem, is investigated. Variation of a deformed plate parameter is used in solving for the plate of minimum volume, given the maximum stress or maximum deflection. Examples are taken from the contexts of transverse flexure of simply supported elliptic plates and of variable-thickness circular plates. For the elliptic plate under uniform load the minimum volume expression is given as a function of the ellipse eccentricity. The corresponding expression for the circular plate is given in terms of plate geometry and the coefficient of transverse

Card 1/2

L 10616-65
ACCESSION NR: AP4043524

deformation. Computed results indicate that volume savings of up to 28% can obtain through the use of the constant-thickness plate. Orig. art. has: 22 formulas and 1 table.

ASSOCIATION: none

SUBMITTED: 10Jan64 ENCL: 00

SUB CODE: ME NO REF SOV: 002 OTHER: 001

Card 2/2

MUSHTAYEV, A.F.

Milling machinery safety attachments. Stan. i instr. 24 no.5:31 My '53.
(MLRA 6:6)
(Milling machines)

MUSHTAYEV, A.F.

Protective devices used in vertical milling machines. Stan.i instr. 27 no.12:30-31 D '56. (MLRA 10:2)
(Milling machines)

BOLTUKHIN, A.K., inzh.; MOROZOV, I.I., inzh.; KUDINOV, V.A., inzh.; LAPIDUS, A.S., inzh.; BELOV, V.S., inzh.; MANUYLOV, L.K., inzh.; MUSHTAYEV, A.F., inzh.; PROKOPOVICH, A.Ye., red.; SHUMSHURINA, Ye.A., red. izd-va; MATVEYEVA, Ye.N., tekhn. red.

[Modernization of planers, slotters, and broaching machines; a guide] Modernizatsiia strogal'nykh, dolbezhnykh i protiazhnykh stankov; rukovodiashchie materialy. Pod red. A.N. Prokopovicha. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1957. 178 p. (MIRA 11:8)

1. Moscow. Eksperimental'nyy nauchno-issledovatel'skiy institut metallorezhushchikh stankov.
(Machine tools)

BOLTUKHIN, A.K.; STERLIN, S.Z.; MUSHTAYEV, A.F.; MOROZOV, I.I.; KUDINOV, V.A.; MONAKHOV, G.A.; AZAREVICH, G.M.; LAPIDUS, A.S.; PROKOPOVICH, A.Ye., redaktor; RZHAVINSKIY, V.V., redaktor izdatel'stva; TIKHANOV, A.Ya., tekhnicheskiy redaktor

[Modernization of knee and column type milling machines; instructions] Modernizatsiia konsol'no-frezernykh stankov; rukovodiashchie materialy. Pod red. A.E.Prokopovicha. Moskva, Gos. nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1957. 194 p. (MLRA 10:8)

1. Moscow. Eksperimental'nyy nauchno-issledovatel'skiy institut metallorezhushchikh stankov
(Milling machines)

MUSHTAYEV, A.F.

Effect of clearances in the elements of drives on the smoothness of table displacements. Stan.i instr. 31 no.8:9-12 Ag '60. (MIRA 13:8)
(Milling machines—Electric driving)

MUSHTAYEV, A.F.

Modern plano-milling machines; survey of foreign literature.
Stan.i instr. 32 no.8:23-30 Ag '61. (MIRA 14:8)
(Milling machines)

MUSHTAYEV, A.F.

Gaps in feed-mechanism drives of heavy plano-milling machines.
Stan.i instr. 33 no.2:11-16 F '62. (MIRA 15:1)
(Feed mechanisms)
(Milling machines)

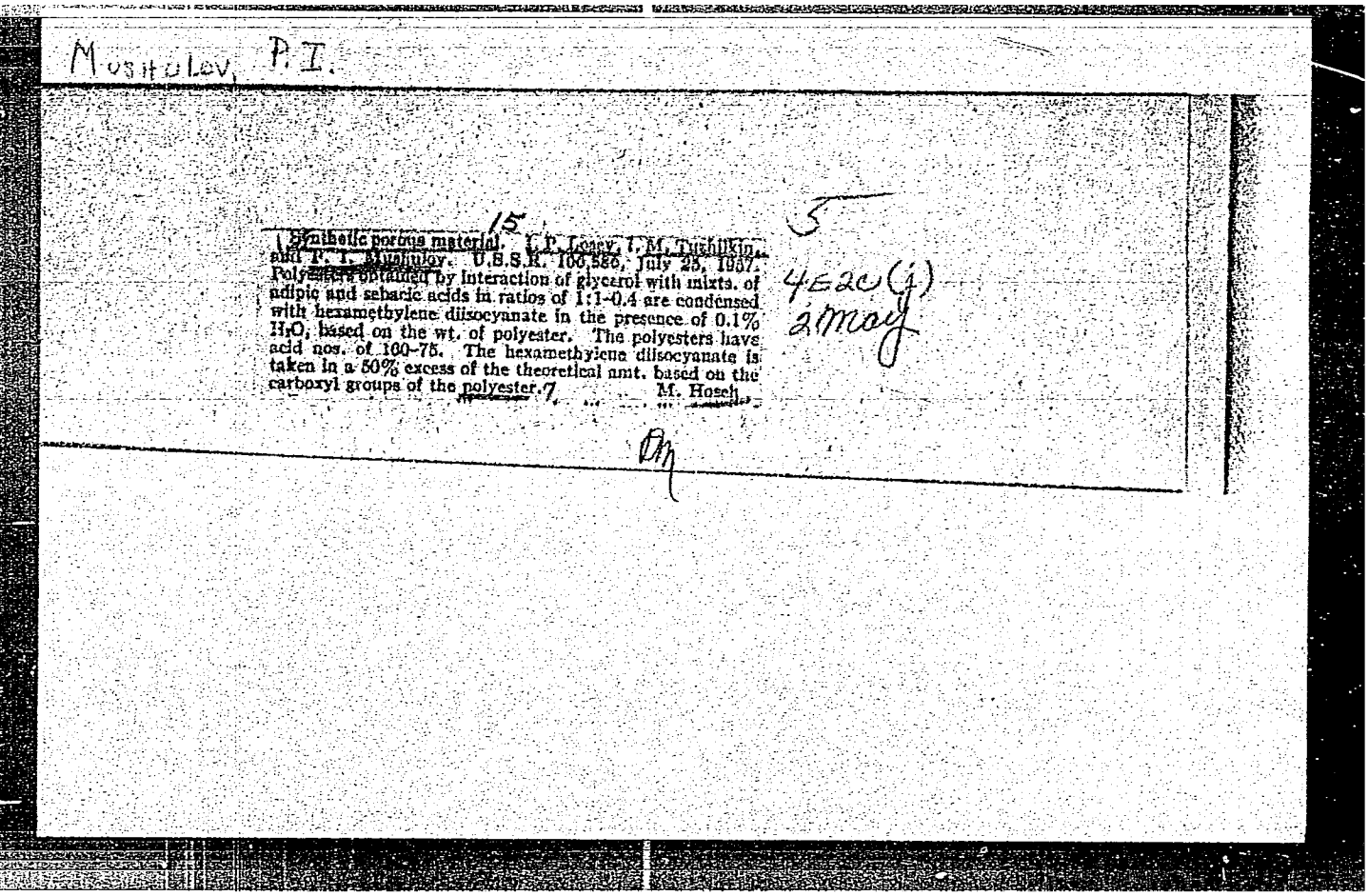
LOVI, A., podpolkovnik; SHUL'GA, N., podpolkovnik; KASHANSKIY, B., mayor; MUSHTENKO, N., mayor.

Simplifying the rules of fire for adjustment from 82 mm. mortars; discussion of an article by Lt. Colonel A. Chervonyi, Docent and Candidate of Technical Sciences, in no. 4. Voen.vest. 36 no.7: 53-60 Jl '56. (MLRA 9:8)

(Mortars (Ordnance))
(Chervonyi, A.)

MUSHTUKOVA, O.Ya.; BORSHCHEVSKAYA, S.I., red.; LEVONEVSKAYA, L.G., tekhn. red.

[In the struggle for economy in the use of materials] V bor'be za ekonomiiu materialov. [Leningrad] Lenizdat, 1954. 59 p. (Novatory leningradskoi promyshlennosti, no.6) (MIRA 11:7)
(Shoe industry)



Mostolev, P. I.

15

Synthetic porous material. G. P. Lotov, I. M. Tuchilkin, and P. I. Mostolov. U.S.S.R. 100,586, July 25, 1957. Polyesters obtained by interaction of glycerol with mixts. of adipic and sebacic acids in ratios of 1:1-0.4 are condensed with hexamethylene diisocyanate in the presence of 0.1% H_2O, based on the wt. of polyester. The polyesters have acid nos. of 100–75. The hexamethylene diisocyanate is taken in a 50% excess of the theoretical amt. based on the carboxyl groups of the polyester. M. Hosch

5

4E2C(j)
21May

LOSEV, I.P., TUZHILKIN, I.M.; MUSHULOV, P.I.

Self-foaming porous plastics made of polyesters and diisocyanates.
Biul.tekh.-ekon.inform. no.2:30-32 '58. (MIRA 11:4)
(Plastics)

MUSIAL, Albin (Krakow, Wyszynskiego 7/6)

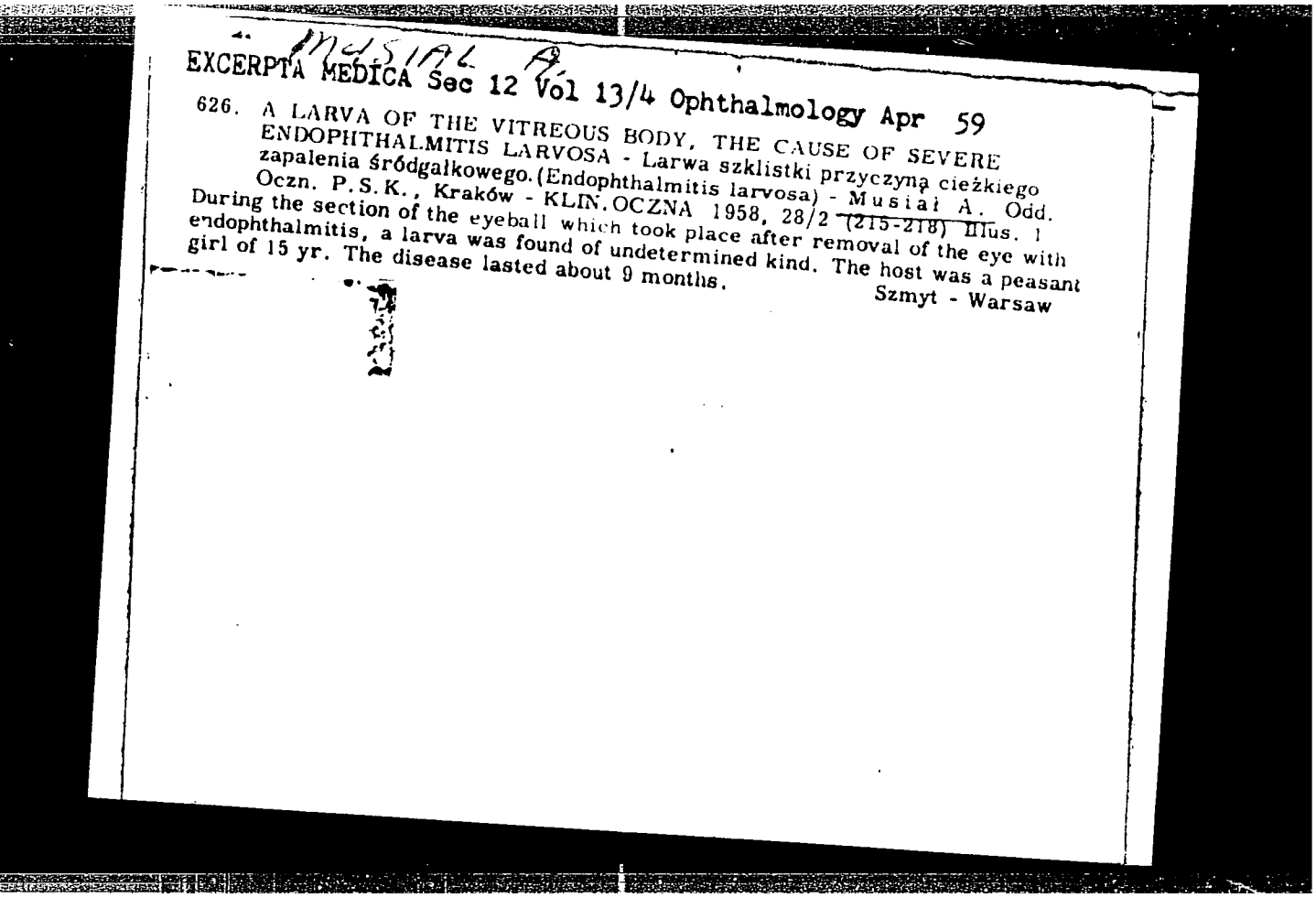
Case of penetration of the human eye by Theromyzon tesselatum.
Klin. oczna 24 no.2:147-148 1954.
(EYE, wounds and injuries,
*penetration by Theromyzon tesselatum)
(LEECHES,
*Theromyzon tesselatum, penetration in human eye)

EXCERPTA MEDICA Sec 12 Vol 13/8 Ophthalmology Aug 59

Pavaloro - Catania

1295. THE THERAPEUTIC RESULTS OF NITROGRANULOGEN TREATMENT ON THE BASIS OF 2.5 YEARS' CLINICAL EXPERIENCE IN OVER 150 CASES - Wyniki leczenia iperytem azotowym na podstawie 2.5-letniego doświadczenia klinicznego w ponad 150 przypadkach - Musiał A., Oddz. Ocznego P.S.K., Kraków - KLIN. OCZNA 1957, 27/3 (269-274)

On the basis of Aleksandrowicz's works concerning the anti-inflammatory effect of nitrogranulogen in various morbid processes, such a treatment for eye diseases was initiated in January, 1949. The doses, 1/10 of those applied in America, were administered according to the programme elaborated by Aleksandrowicz. In September, 1949, at the Congress of the Polish Ophthalmological Society in Cracow, the therapeutical results in over 40 cases were discussed. Up to the present moment, the number of patients treated with nitrogranulogen exceeds 150. The results are encouraging.



M45192 A

EXCERPTA MEDICA Sec 12 Vol 13/4 Ophthalmology Apr 59

626. A LARVA OF THE VITREOUS BODY, THE CAUSE OF SEVERE ENDOPHTHALMITIS LARVOSA - Larwa szklistki przyczyną ciężkiego zapalenia śródgałkowego. (Endophthalmitis larvosa) - Musiał A. Odd. Oczn. P.S.K., Kraków - KLIN. OCZNA 1958, 28/2 (215-218) Illus. 1

During the section of the eyeball which took place after removal of the eye with endophthalmitis, a larva was found of undetermined kind. The host was a peasant girl of 15 yr. The disease lasted about 9 months.

Szmyt - Warsaw

MUSIAL, Andrzej

Some notes on coal deposits in Korea with regard to the coal mine deposits in Sin-Ch'ang and An-Dju. Przegl geol 10 no.6:316-318 Je '62.

1. Zjednoczenie Przedsiebiorstw Geologicznych, Warszawa.

MUSIAL, Antoni

Two-jaw apparatus with stiff transposable arms guiding the mandible for the treatment of progenia disturbances. Czas. stomat. 18 no.5:497-501 My'65.

1. Z Zakładu Ortodoncji Slaskiej Akademii Medycznej w Katowicach (Kierownik: doc. dr. F. Labiszewska-Jarmolska).

MUSIAL, Edward, mgr.inz.

On the selection of the proper cross-section installation pipes.
Wiad elektrotechn 30 no.2:46-47 F '62.

1. Politechnika, Gdansk.

MUSIAL, Edward, mgr inz.

"The electric wireman; collection of information in questions and answers" by F. Rozmus, W. Stanislawski. Reviewed by Edward Musial. Wiad elektrotechn 32 no. 1:29 Ja '64.

MUSIAL, J.

For an interdepartmental accounts settlement. p. 260.
(PRZEGLĄD SKORZANY. Vol. 11, no. 10, Oct. 1956, Lodz, Poland)

SO: Monthly List of East European Accessions (EEAL) LC. Vol. 6, No. 12, Dec. 1957. Uncl.

BETAK, M., inz.; MUSIAL, J.

Development of two-layer panels at the Prazske cihelny National Enterprise. Stavivo 41 no.10:356-358 O '63.

MUSIAL, L.; CHOBOT, M.; PUDO, J.

Water pollution in the Raba River. Gosp wodna 21 no.8:359 Ag '61.

MUSIAL, L.; FUDO, J.; LABUZ, W.

Water pollution of the Skawa River. Gosp wodna 21 no.8:360 Ag '61.

MUSIAL, Leopold

New derivatives of hydanton substituted in the positions 3,5. I. p. 1115.

POLAND

ROCZNIKI CHEMII. (Polska Akademia Nauk Warszawa) Vol. 32, no. 5, 1958

Monthly List of East European Accessions (EEAI) LC, Vol. 8, no. 7, July 1959

Uncl.

MUSIAL, Leopold

On new substituted hydantoin derivatives in the 3 and 5 positions. III. Rocz chemii 35 no.6:1651-1660 '61.

1. Zaklad Chemii, Wyzsza Szkola Pedagogiczna, Krakow.

MUSIAL, Leopold; KOROHODA, Maria Jolanta

New hydantoin derivatives substututed in positions 3 and 5.
Pt. 4. Rocz chemii 36 no.11:1607-1614 '62.

1. Katedra Chemii, Wyzsza Szkola Pedagogiczna, Krakow.

MUSIAL, Leopold; STANIEC, Jadwiga

New hydantoin substitution derivatives in positions 3 and 5.
Pt. 5. Rocz chemii 37 no.6:621-628 '63.

1. Katedra Chemii, Wyzsza Szkola Pedagogiczna, Krakow.